



SPW

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 10/718,780 Confirmation No.: 1463  
Applicant : Mehrdad NIKOONAHAD  
Filing Date : November 20, 2003  
Title : SYSTEM AND METHOD FOR CHARACTERIZING THREE-DIMENSIONAL  
STRUCTURES  
Group Art Unit : Not Yet Assigned  
Examiner : Not Yet Assigned  
Docket No. : 14434.4001  
Customer No. : 34313

Mail Stop Patent Application  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

### INFORMATION DISCLOSURE STATEMENT

Sir:

In accordance with 37 CFR §§ 1.97 and 1.98, the items identified in this Information Disclosure Statement ("IDS") are brought to the attention of the Office. The items are listed on the attached form PTO-1449. In accordance with the USPTO waiver of the requirement under 37 CFR 1.98(a)(2)(i), only copies of foreign patent documents and non-patent literature are enclosed for the convenience of the Examiner.

The items identified in this IDS may or may not be "material" pursuant to 37 CFR § 1.56. The submission thereof by Applicant is not to be construed as an admission that any such patent, publication, or other information referred to therein is material or considered to be material (37 CFR § 1.97(h)), or even qualifies as "prior art" under 35 USC § 102 with respect to this invention unless specifically designated by Applicant as such.

---

#### CERTIFICATE OF MAILING (37 C.F.R. § 1.8(a))

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as First Class Mail in an envelope addressed to Mail Stop Patent Application, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Date of Deposit: May 28, 2004

  
Davin M. Stockwell

Applicant : Mehrdad NIKOONAHAD  
Appl. No. : 10/718,780  
Examiner : Not Yet Assigned  
Docket No. : 14434.4001

**INFORMATION DISCLOSURE STATEMENT FILING PROVISION:**

☒ This IDS is believed to be timely in that it is being submitted under 37 CFR § 1.97(b), that is (1) within three months of the filing date of the application, which is not a continued prosecution application filed under § 1.53(d); or (2) within three months of entry of the national stage as set forth in 37 CFR § 1.491; or (3) before the mailing of a first Office action on the merits; or (4) before the mailing of a first Office action after filing a request for continued examination under § 1.114. Thus, no fee is required.

☒ However, if the undersigned is in error in this regard, Applicant respectfully requests that the Office consider this IDS as filed under 37 CFR § 1.97(c), if applicable, and charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

☐ However, if the undersigned is in error in this regard, Applicant respectfully requests that the Office consider this IDS as filed under 37 CFR § 1.97(c), if applicable, and a statement under 37 CFR § 1.97(e) is included below, thus no fee is required.

☐ This IDS is being submitted under 37 CFR § 1.97(c), that is after mailing of a first Office action on the merits, but before a Final Action under 37 CFR § 1.113 or a Notice of Allowance under 37 CFR § 1.311.

☐ The fee due under 37 CFR § 1.17(p) is submitted herewith.

☐ A statement under 37 CFR § 1.97(e) is included below, thus no fee is required. In the event that this IDS is not received before a Final Action or a Notice of Allowance, then Applicant respectfully requests that the Office consider the filing of these papers to be submitted under 37 CFR § 1.97(d) and charge the fee due under 37 CFR § 1.17(p) to the deposit account below.

☐ This IDS is being submitted under 37 CFR § 1.97(d), that is after a Final Action under 37 CFR § 1.113 or a Notice of Allowance under 37 CFR § 1.311, but before payment of the issue fee. A statement under 37 CFR § 1.97(e) is included below. The fee due under 37 CFR § 1.17(p) is submitted herewith.

Applicant : Mehrdad NIKOONAHAD  
Appl. No. : 10/718,780  
Examiner : Not Yet Assigned  
Docket No. : 14434.4001

**STATEMENT UNDER 37 CFR § 1.97(e):**

- ☐ Each item contained in this IDS was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this IDS.
- ☒ No item contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application.

**PAYMENT AND/OR AUTHORIZATION TO CHARGE FEES:**

- ☐ A check in the amount of \_\_\_\_\_ is enclosed for the above fee(s).
- ☐ Please charge \_\_\_\_\_ to Deposit Account No. **15-0665** for the above fee(s).
- ☒ The Commissioner is authorized to charge any fees required by the filing of these papers, and to credit any overpayment to Orrick, Herrington & Sutcliffe's Deposit Account No. **15-0665**.

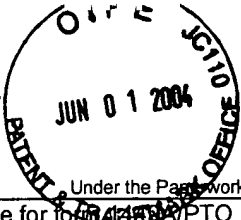
Respectfully submitted,

ORRICK, HERRINGTON & SUTCLIFFE LLP

Dated: May 28, 2004

By: *Davin M. Stockwell*  
Davin M. Stockwell  
Reg. No. 41,334

ORRICK, HERRINGTON & SUTCLIFFE LLP  
4 Park Plaza, Suite 1600  
Irvine, CA 92614  
949/567-6700 Telephone  
949/567-6710 Facsimile



Under the Patent Work Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  (use as many sheets as necessary)				<b>Complete if Known</b>	
				Application Number	10/718,780
				Filing Date	November 20, 2003
				First Named Inventor	Mehrdad NIKOONAHAD
				Art Unit	Not Yet Assigned
				Examiner Name	Not Yet Assigned
Sheet	1	of	4	Attorney Docket Number	14434.4001

U.S. PATENT DOCUMENTS				
Examiner Initials	Cite No. <sup>1</sup>	U.S. Patent Document Number-Kind Code <sup>2</sup> (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document
	AA	US 2004/0070772 A1	04-15-2004	Shchegrov et al.
	AB	US 2004/0017574 A1	01-29-2004	Vuong et al.
	AC	US 2003/0206298 A1	11-06-2003	Bischoff et al.
	AD	US 2002/0101585 A1	08-01-2002	Benesch et al.
	AE	US 2002/0051564 A1	05-02-2002	Benesch et al.
	AF	US 6,721,052 B2	04-13-2004	Zhao et al.
	AG	US 6,704,661 B1	03-09-2004	Opsal et al.
	AH	US 6,694,284 B1	02-17-2004	Nikoonahad et al.
	AI	US 6,694,275 B1	02-17-2004	Jakadar et al.
	AJ	US 6,689,519 B2	02-10-2004	Brown et al.

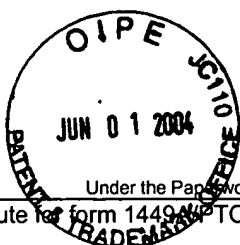
FOREIGN PATENT DOCUMENTS				
Examiner Initials	Cite No. <sup>1</sup>	Foreign Patent Document Country <sup>3</sup> Number <sup>4</sup> Kind Code <sup>5</sup> (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document T <sup>6</sup>
	BA			
	BB			

OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS			
Examiner Initials <sup>1</sup>	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>2</sup>
	CA	LOGOFATU, PETRE C., "UV Scatterometry," Proceedings of SPIE: Metrology, Inspection, and Process Control for Microlithography XVII, May 2003, pp. 208-214, Vol. 5038, The International Society for Optical Engineering (SPIE), Bellingham, Washington, USA.	
	CB	HETTWER, ANDREA et al., "Phi-Scatterometry for Integrated Linewidth and Process Control in DRAM Manufacturing," IEEE Transactions on Semiconductor Manufacturing, November 2002, pp. 470-477, Vol. 15, No. 4, Institute of Electrical and Electronics Engineers (IEEE), New York, New York, USA.	

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. <sup>1</sup>Applicants unique citation designation number (optional). <sup>2</sup>See Kinds of U.S. Patent Documents at [www.uspto.gov](http://www.uspto.gov) or MPEP 901.04. <sup>3</sup>Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup>For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup>Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup>Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 USC 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you are required to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS, SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450



PTO/SB/08a (08-03)

Approved for use through 7/31/06. OMB 0651-0031

Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449-PTO

**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**

(use as many sheets as necessary)

**Complete if Known**

Sheet	2	of	4	Application Number	10/718,780
				Filing Date	November 20, 2003
				First Named Inventor	Mehrdad NIKOONAHAD
				Art Unit	Not Yet Assigned
				Examiner Name	Not Yet Assigned
				Attorney Docket Number	14434.4001

**U.S. PATENT DOCUMENTS**

Examiner Initials	Cite No. <sup>1</sup>	U.S. Patent Document Number-Kind Code <sup>2</sup> (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document
	DA	US 6,665,071 B2	12-16-2003	Hovinen et al.
	DB	US 6,645,824 B1	11-11-2003	Yang et al.
	DC	US 6,636,843 B2	10-21-2003	Doddi et al.
	DD	US 6,633,831 B2	10-14-2003	Nikoonahad et al.
	DE	US 6,608,690 B2	08-19-2003	Niu et al.
	DF	US 6,608,686 B1	08-19-2003	Lane et al.
	DG	US 6,583,731 B2	06-24-2003	Chan et al.
	DH	US 6,483,580 B1	11-19-2002	Xu et al.
	DI	US 6,451,621 B1	09-17-2002	Rangarajan et al.
	DJ	US 6,433,878 B1	08-13-2002	Niu et al.

**FOREIGN PATENT DOCUMENTS**

Examiner Initials	Cite No. <sup>1</sup>	Foreign Patent Document Country <sup>3</sup> Number <sup>4</sup> Kind Code <sup>5</sup> (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	T <sup>6</sup>
	EA				
	EB				

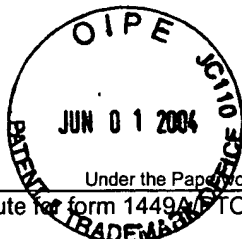
**OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS**

Examiner Initials	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>2</sup>
	FA	NIU, XINHUI et al., "Specular Spectroscopic Scatterometry," IEEE Transactions on Semiconductor Manufacturing, May 2001, pp. 97-111, Vol. 14, No. 2, Institute of Electrical and Electronics Engineers (IEEE), New York, New York, USA.	
	FB	SCHNEIDER, CLAUS et al., "Integrated metrology: An enabler for advanced process control (APC)," Proceedings of SPIE: In-Line Characterization, Yield, Reliability, and Failure Analysis in Microelectronic Manufacturing II, April 2001, pp. 118-130, Vol. 4406, The International Society for Optical Engineering (SPIE), Bellingham, Washington, USA.	

Examiner Signature	Date Considered
-----------------------	--------------------

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. <sup>1</sup>Applicants unique citation designation number (optional). <sup>2</sup>See Kinds of U.S. Patent Documents at [www.uspto.gov](http://www.uspto.gov) or MPEP 901.04. <sup>3</sup>Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup>For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup>Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup>Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 USC 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you are required to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS, SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450



PTO/SB/08a (08-03)

Approved for use through 7/31/06. OMB 0651-0031  
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449A-PTO

**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**

(use as many sheets as necessary)

**Complete if Known**

Sheet	3	of	4	Application Number	10/718,780
				Filing Date	November 20, 2003
				First Named Inventor	Mehrdad NIKOONAHAD
				Art Unit	Not Yet Assigned
				Examiner Name	Not Yet Assigned
				Attorney Docket Number	14434.4001

**U.S. PATENT DOCUMENTS**

Examiner Initials	Cite No. <sup>1</sup>	U.S. Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document
		Number-Kind Code <sup>2</sup> (if known)		
	GA	US 6,429,943 B1	08-06-2002	Opsal et al.
	GB	US 6,323,946 B1	11-27-2002	Norton
	GC	6,124,924	09-26-2000	Feldman et al.
	GD	5,771,094	06-23-1998	Carter et al.
	GE	5,747,813	05-05-1998	Norton et al.
	GF	5,608,526	03-04-1997	Piwonka-Corle et al.
	GG	5,604,344	02-18-1997	Finarov et al.
	GH	5,596,411	01-21-1997	Fanton et al.
	GI	5,412,473	05-02-1995	Rosencwaig et al.
	GJ	5,329,357	07-12-1994	Bernoux et al.

**FOREIGN PATENT DOCUMENTS**

Examiner Initials	Cite No. <sup>1</sup>	Foreign Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	T <sup>6</sup>
		Country <sup>3</sup> Number <sup>4</sup> Kind Code <sup>5</sup> (if known)			
	HA				
	HB				

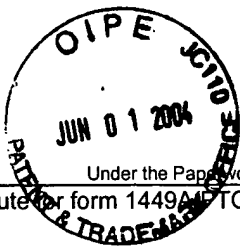
**OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS**

Examiner Initials <sup>1</sup>	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>2</sup>
	IA	BENESCH, NORBERT et al., "Phi-Scatterometry for Integrated Linewidth Control in DRAM Manufacturing," 2001 IEEE International Symposium on Semiconductor Manufacturing, October 8-10, 2001, pp. 129-132, IEEE Catalog No. 01CH37203, San Jose, California, USA.	
	IB	COULOMBE, STEPHEN A. et al., "Scatterometry measurement of sub-0.1 $\mu$ m linewidth gratings," Journal of Vacuum Science & Technology B: Microelectronics and Nanometer Structures, January, 1998, pp. 80-87, Vol. 16, Issue 1, American Vacuum Society, Research Triangle Park, North Carolina, USA.	

Examiner Signature	Date Considered
-----------------------	--------------------

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. <sup>1</sup>Applicants unique citation designation number (optional). <sup>2</sup>See Kinds of U.S. Patent Documents at [www.uspto.gov](http://www.uspto.gov) or MPEP 901.04. <sup>3</sup>Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup>For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup>Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup>Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 USC 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you are required to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS, SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450



Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  (use as many sheets as necessary)				<b>Complete if Known</b>	
				Application Number	10/718,780
				Filing Date	November 20, 2003
				First Named Inventor	Mehrdad NIKOONAHAD
				Art Unit	Not Yet Assigned
				Examiner Name	Not Yet Assigned
Sheet	4	of	4	Attorney Docket Number	14434.4001

U.S. PATENT DOCUMENTS				
Examiner Initials	Cite No. <sup>1</sup>	U.S. Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document
		Number-Kind Code <sup>2</sup> (if known)		
	JA	5,181,080	01-19-1993	Fanton et al.
	JB	5,042,951	08-27-1991	Gold et al.
	JC	4,999,014	03-12-1991	Gold et al.

FOREIGN PATENT DOCUMENTS					
Examiner Initials	Cite No. <sup>1</sup>	Foreign Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document T <sup>6</sup>	
		Country <sup>3</sup> Number <sup>4</sup> Kind Code <sup>5</sup> (if known)			
	KA				
	KB				

OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS			
Examiner Initials <sup>1</sup>	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>2</sup>
	LA	RAYMOND, CHRISTOPHER J. et al., "Multiparameter grating metrology using optical scatterometry," Journal of Vacuum Science & Technology B: Microelectronics and Nanometer Structures, March, 1997, pp. 361-368, Vol. 15, Issue 2, American Vacuum Society, Research Triangle Park, North Carolina, USA.	
	LB	GIOVANNINI, H. et al., "Angle-resolved polarimetric phase measurement for the characterization of gratings," Optics Letters, October 15, 1996, pp. 1619-1621, Vol. 21, No. 20, Optical Society of America, Washington, DC, USA.	

Examiner Signature		Date Considered	
-----------------------	--	--------------------	--

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. <sup>1</sup>Applicants unique citation designation number (optional). <sup>2</sup>See Kinds of U.S. Patent Documents at [www.uspto.gov](http://www.uspto.gov) or MPEP 901.04. <sup>3</sup>Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup>For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup>Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup>Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 USC 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you are required to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS, SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450